

Organics Olympiad 2016: Global Indices of Leadership in Organic Agriculture

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Abstract: Organic production (including agriculture, wild culture, forestry and aquaculture) is a worldwide phenomenon that is practiced in at least 172 countries. The Organics Olympiad presents 14 indices of global organics leadership, each at three levels (Gold, Silver and Bronze). The Organics Olympiad of 2016 yields 29 countries as global organics leaders, and confirms that organics leadership is diversely distributed across countries, large and small, rich and poor, developed and less so, and cuts across linguistic, ethnic and cultural boundaries. Australia continues to lead the world in organic agriculture hectares. Australia also leads in the increase of organic hectares over the past four years (since the Organics Olympiad 2012) and in the number of WWOOF (Willing Workers on Organic Farms) hosts. Finland leads in organic wild culture hectares. Vietnam leads in organic aquaculture hectares, and Tunisia leads in organic forest hectares. Germany leads in biodynamic hectares, as well as with the number of members of IFOAM-Organics International. India leads for the number of organic producers. The Falkland Islands (Malvinas) leads in terms of the percentage agricultural land dedicated as organic. Switzerland leads with the value of organics consumption per capita. USA leads in the value of the organics market. Denmark leads in the publishing of organics research papers over the past four years. Namibia leads in the percentage increase in organic hectares over the past four years. The overall global organics leaders, on the basis of aggregated scores, are Australia, Germany, and Switzerland, in positions one, two and three, respectively. This study demonstrates the successful global diffusion of organics, and identifies that leadership lessons can be available from a broad diversity of countries. Key implications are identified.

Keywords: *Organic farming, organic wild culture, organic forestry, organic aquaculture, biodynamic agriculture, worldwide statistics, FiBL, IFOAM, Organics International, Demeter, WWOOF*

1. Introduction

The great retreat of global organic agriculture, from its historical position of global dominance, dates from 1909 with the development of the Haber Bosch method of making industrial quantities of synthetic fertilizer (Smil, 2001). This retreat was then reinforced by the rapid development of the chemical industry in the twentieth century, and the impetus given by two world wars in creating toxic chemicals for warfare and then 'successfully' repurposing chemicals for agriculture. Rudolf Steiner made the call in 1924 for an agriculture differentiated from the prevailing march of chemical agriculture, and his call led to the development of biodynamic agriculture (Paull, 2011a; Pfeiffer, 1938; Steiner, 1924). Lord Northbourne hosted a conference on his farm in Kent in 1939 (Paull, 2011b) and, in the following year, published his manifesto of what he dubbed 'organic farming' and in which he framed a contest of 'organic versus chemical farming' (Northbourne, 1940; Paull, 2014). These were major milestones in the quest to restore organic agricultural practices to mainstream agriculture. Despite nine decades of activism, organic agriculture is reported as just 0.99% of world agriculture (Willer & Lernoud, 2016).

In the view of these pioneers of organic agriculture, the mission of the organics movement is to restore organic agriculture as the global dominant agriculture. Steiner urged his followers to win converts by demonstrating the superior outcomes of organic over chemical agriculture (Steiner, 1924). Northbourne was under no illusions as to the magnitude of the task, just how long it might take, and with no guarantee of success: "It is a task for generations of concentrated effort, slow and laborious, needing all available skill and resources ... A combination of cooperation and individual effort ... And those engaged will be fighting a rearguard action for many decades, perhaps for centuries" (Northbourne, 1940, p.115). Organic production excludes the use of synthetic fertilizers and pesticides, genetically modified organisms (GMOs),

nanotechnology, and food irradiation. Consumers purchase organic food for reasons of health, environment and animal welfare (ACNielsen, 2005). A French study reported that organic food was more nutrient-dense, that 94-100% of organic food samples were pesticide-free, that those samples testing positive for residues were below the regulated maximum residual level (MRL), and that this contrasted with the results for non-organic food in which 17-50% of samples contained pesticide residues (Lairon, 2010). Children consuming an organic food diet show reduced pesticide exposure and a lower body burden of pesticides (Curl, Fenske, & Elgehun, 2003). Coinciding with the year of the Rio 2016 Olympic Games (www.rio2016.com), the Organics Olympiad 2016 identifies global leaders in the organics sector. Organics Olympiads have previously appeared (Paull, 2008, 2011c, 2012) and past Olympiads offer some comparisons to the present state of organics leadership.

2. Methodology

Organic food and agriculture statistics are generally not disaggregated by government agencies from the whole of the food and agriculture sectors, although this is slowly changing. The present study draws on NGO data sets from multiple sources: Research Institute of Organic Agriculture (FiBL); Demeter International; the International Centre for Research in Organic Food Systems (ICROFS); IFOAM-Organics International; and WWOOF (Willing Workers on Organic Farms) national groups. Fourteen indices of organics leadership are identified, and for each index, the top three countries are 'awarded' a Gold, Silver or Bronze 'medal', for ranking first, second or third respectively. This process is an opportunity for identifying a range of leadership within the global organics sector. The results are then weighted (Gold=3, Silver=2, Bronze=1) to produce a ranked listing of global organics leaders.

3. Results

Organics Olympiad Medals

Agriculture: The global total for certified organically managed agricultural land is 43,668,229 hectares (this is an increase of 17.9% since the Organics Olympiad 2012 (Paull, 2012)). Australia now accounts for 39.3% of the world's organic agriculture land (up from 32.2% from the 2012 figure). The three lead countries, Australia, Argentina and USA, together account for over half (51.3%) of the world's certified organic agriculture land (Table 1) (this represents a consolidation of leadership and it is up from the 48.9% of the Organics Olympiad 2012).

Table 1: Organic agriculture hectares (Willer & Lernoud, 2016).

MEDAL	Country	Statistic
Gold	Australia	17,150,000 hectares
Silver	Argentina	3,061,965 hectares
Bronze	USA	2,178,471 hectares

Wild culture: Global organic wild culture (wild collection) accounts for 37,442,296 hectares (down 9.8% from 41,505,511 hectares of the previous Olympiad). The organic wild culture is now less than the organic agriculture hectares (a reversal of the position of the Organics Olympiad 2012). In wild collection areas, the harvest includes wild berries, wild mushrooms, wild medicinal plants, wild fruits, wild vegetables, honey and seaweed. Finland, accounts for 24.3% of the global total (up from 18.8% of the Organics Olympiad 2012). The leading three countries, Finland, Zambia and India, together account for 53.2% of the world's organic wild culture hectares (Table 2) (this is a consolidation of leadership; in the Organics Olympiad 2012, the three leaders, Finland, Brazil and Cameroon, together accounted for 48.1%).

Table 2: Organic wild culture hectares (Willer & Lernoud, 2016).

MEDAL	Country	Statistic
Gold	Finland	9,100,000 hectares
Silver	Zambia	6,826,424 hectares
Bronze	India	3,990,000 hectares

Aquaculture: Global organic aquaculture accounts for 43,222 hectares (up 80.6% from the 23,930 hectares of the Organics Olympiad 2012). Vietnam accounts for 46.3% of the total. Organic aquaculture statistics are reported for only seven countries. The three leading countries, Vietnam, Bangladesh and Lithuania, account for 79.6% of the total organic aquaculture hectares (down from 98.6% of the Organics Olympiad 2012, and hence there has been a broadening of the base) (Table 3). Brazil and China appeared in previous Organics Olympiads (Paull, 2011c, 2012) but they currently report no organic aquaculture.

Table 3: Organic aquaculture hectares (Willer & Lernoud, 2016).

MEDAL	Country	Statistic
Gold	Vietnam	20,030 hectares
Silver	Bangladesh	9,338 hectares
Bronze	Lithuania	5,049 hectares

Forestry: Global organic forestry hectares are reported at 62,589 hectares (up tenfold (974%) from the 5,829 hectares of the Organics Olympiad 2012). Organic forestry hectares now exceed the area of organic aquaculture (a reversal from the Organics Olympiad 2012). Tunisia is a newcomer to the leadership triad and it accounts for 68.1% of global organic forestry hectares. The leading three countries, Tunisia, Portugal, and Nigeria account for 99.6% of the global organic forest hectares (Table 4). Only five countries report organic forestry statistics, the three leaders together with Azerbaijan and Canada. In the Organics Olympiad 2012, Iceland and Malawi appeared as leaders but these two countries currently report no organic forest hectares.

Table 4: Organic forest hectares (Willer & Lernoud, 2016).

MEDAL	Country	Statistic
Gold	Tunisia	42,646 hectares
Silver	Portugal	19,533 hectares
Bronze	Nigeria	150 hectares

Biodynamic: Biodynamic agriculture is a differentiated style of organic agriculture that derives from Rudolf Steiner's Agriculture Course delivered in Koberwitz (Kobierzyce, Poland) in 1924 (Paull, 2011a). According to the certifier Demeter-International, there are 161,074 certified biodynamic hectares across 60 countries (up 11.5% from the 144,497 biodynamic agricultural hectares, and up from 48 countries of the Organics Olympiad 2012). Germany is the leading country for biodynamic and it accounts for 45.1% of the global hectares total. The leading three countries, Germany, Italy and France together account for 58.3% of the world's biodynamic hectares (Table 5) (previously the top three countries, which then included India and not France) accounted for 56.7% of the global biodynamic total). No data is available on this parameter for Australia.

Table 5: Biodynamic hectares (Data Source Demeter 2016).

MEDAL	Country	Statistic
Gold	Germany	72,588 hectares
Silver	Italy	11,524 hectares
Bronze	France	9,873 hectares

Producers: Global organic producers reportedly total 2,260,361 (up 43.2% from the 1,578,407 entities from the Organics Olympiad 2012). This figure is an underestimate since it appears that while some countries report farmers, others report farms and/or agricultural entities. India is the leading country and accounts for 28.8% of the global total (down from 37.4%). The leading three countries, India, Uganda and Mexico, together account for 44.7% of the world's producers of organics (Table 6) (down from 54.9%, and so the base has expanded). No data was available on this parameter for China.

Table 6: Organic producers(Willer & Lernoud, 2016).

MEDAL	Country	Statistic
Gold	India	650,000 producers
Silver	Uganda	190,552 producers
Bronze	Mexico	169.703 producers

Percentage Organic: The Falkland Islands (Malvinas) has, over the past several years, implemented a rapid uptake of organics, and is now the standout leader in terms of the percentage of agricultural land devoted to organic, with their organics share of agricultural land accounting for 36.3% (up from 35.9% from the Organics Olympiad 2012). Liechtenstein follows with 30.9% of its agricultural land as organic (up from 27.3%), and is followed by Austria with 19.4% (down from 19.7% of the Organics Olympiad 2012) (Table 7). Australia, by comparison rates 4.2% on this index (up from 2.9%), and the global figure is reported as 0.99% (up from 0.85% (Willer & Lernoud, 2016).

Table 7: Organic share of agricultural land (Willer & Lernoud, 2016).

MEDAL	Country	Statistic
Gold	Falkland Islands (Malvinas)	36.3%
Silver	Liechtenstein	30.9%
Bronze	Austria	19.4%

Market: Global sales of organic food and beverages are estimated at US\$80 billion, €60.4 billion (up from US\$59.1 billion, €44.5 billion, of the Organics Olympiad 2012). The three leading countries, USA, Germany and France, account for 66% of the global market (Table 8).

Table 8: Organic market (Willer & Lernoud, 2016).

MEDAL	Country	Statistic
Gold	USA	€27.1b (US\$35.9b)
Silver	Germany	€7.9b (US\$10.5b)
Bronze	France	€4.8b (US\$6.8b)

Per Capita Consumption: European countries lead in the per capita consumption of organics with Switzerland in position one (previously Denmark) with an annual spend of €221 per capita, followed by Luxembourg and Denmark (Table 9).

Table 9: Organic per capita consumption(Willer & Lernoud, 2016).

MEDAL	Country	Statistic
Gold	Switzerland	€221
Silver	Luxembourg	€164
Bronze	Denmark	€162

Membership: IFOAM-Organics International (formerly the International Federation of Organic Agriculture Movements) was founded in France in 1972 by five associations, advocates of organics or biodynamic (Paull, 2010). It is based in Bonn, Germany, and is the peak international organization for the certified organics sector, with 787 affiliated organizations as members from 119 countries (down from 804 affiliates, and up from 111 countries). The membership includes organic certifiers, and research and other organizations participating in the organics sector. Germany leads with a membership of 64, followed by China, and the India (Table 10). If the Hong Kong affiliates (N=7) are aggregated with the China affiliates (N=57) this would put China and Germany on a par with 64 affiliates each.

Table 10: Membership of IFOAM(IFOAM-Organics International, 2016).

MEDAL	Country	Statistic
Gold	Germany	64 affiliates
Silver	China	57 affiliates
Bronze	India	41 affiliates

Hectares Increase: There has been a global total increase of 6,627,225 hectares of certified organic agriculture land since the Organics Olympiad 2012. Australia accounts for 77.7% of the four-year increase, China accounts for 8.1% of the increase, and Uruguay accounts for 5.7% of the four-year increase (Table 11). These three countries together account for 91.4% of the global increase in organic agriculture hectares reported over the past four years.

Table 11: Organic hectares increase, 2012 - 2016 (Willer & Kilcher, 2012; Willer & Lernoud, 2016).

MEDAL	Country	Statistic
Gold	Australia	5,148,276
Silver	China	535,000
Bronze	Uruguay	376,456

Percentage Increase: There has been a global 17.9% increase in certified organic agriculture hectares since the Organics Olympiad 2012. This increase has been very uneven across organic reporting countries with some countries reporting decreases while some have increased their hectares by thousands of percent. Namibia, from a low base, has reported an increase in excess of 24,000% increase (from 124 ha to 30,082 ha), Fiji has reported an increase in excess of 9,000% (from 100 ha to 9218 ha), and Myanmar has reported an increase in excess of 8,000% (from 60 ha to 5320 ha) (Table 12).

Table 12: Organic hectares percentage increase, 2012 - 2016(Willer & Kilcher, 2012; Willer & Lernoud, 2016)

MEDAL	Country	Statistic
Gold	Namibia	24,160%
Silver	Fiji	9,118%
Bronze	Myanmar	8,767%

WWOOF: Willing Workers on Organic Farms (WWOOF) was founded in the UK in 1971 and it offers opportunities to volunteer to work on organic farms in exchange for meals and accommodation (WWOOF, 2012). The UK has 688 hosts (WWOOF UK, 2016). WWOOF is now an international movement with hosts in more than 55 countries (WWOOF, 2012). WWOOF has grown and prospered in the process of its international diffusion. Australia has 2,600 hosts (WWOOF Australia, 2016), New Zealand has 2,340 hosts (Millener, 2016), and the USA has 2,052 hosts (WWOOF USA, 2016) (Table 13).

Table 13: WWOOF hosts (Millener, 2016; WWOOF Australia, 2016; WWOOF USA, 2016).

MEDAL	Country	Statistic
Gold	Australia	2,600 hosts
Silver	New Zealand	2,340 hosts
Bronze	USA	2,052 hosts

Research: Organic Eprints (www.orgprints.org) is an open access archive of organics research and it is the largest depository devoted to research papers on organics hosting 18,375 research papers (ICROFS, 2016) (an increase of 44.4% and up from 12,726 entries available at the time of the Organics Olympiad 2012). This digital archive is a project of the International Centre for Research in Organic Food Systems (ICROFS; www.icrofs.org). Sixty six countries are associated with contributed research papers in this data base (up from sixty). The leading contributor to this archive, based on the country of research affiliations, is Germany with 4257 contributions and accounting for 23.2% of the total entries (down from 26.1% of the Organics Olympiad 2012). The three lead countries, Germany, Denmark (with 3965 total entries) and Switzerland (with 3239 total entries), dominate the orgprints resource, together accounting for 62.4% of the entries (down from 64.6%). Table 14 is a record of the research output since the Organics Olympiad 2012 and the tabulation of increments preserves the same three countries but reverses the order, with Switzerland taking a strong lead for organics research outputs.

Table 14: Organics research papers 2012-2016 (ICROFS, 2012, 2016).

MEDAL	Country	Statistic
Gold	Switzerland	1339 entries
Silver	Denmark	965 entries
Bronze	Germany	932 entries

Organic Olympiad Medals Tally: The results of Tables 1 to 14 are presented as an aggregated medal tally in Table 15. Twenty nine countries are identified as organics leaders, each scoring at least a single medal. In this Olympiad, 42 medals are in contention. Both Germany and USA scored four medals each indicating a breadth of leadership (Table 15). For each country appearing in the medal tally, a weighted score is presented, with the following weightings applied to medals: Gold=3; Silver=2; Bronze=1. Thus, for this Olympiad, there are a total of 84 points in contention. No country scored more than a weighted score of nine (Table 15). Three gold medals put Australia in the lead in the Organics Olympiad 2016 results. Germany, with four medals, secured the second place. Switzerland ranked in third place with two Gold medals. India and the USA ranked in equal fourth place each with a Gold and two Bronze medals (Table 15).

Table 15: Organics Olympiad 2016 medal tally: listing of organics lead countries (Based on 14 indicators, Tables1-14, countries with equal rankings are tabulated in alphabetical order)

Ranking*	COUNTRY	Gold	Silver	Bronze	Medal Tally	Weighted Score
1	Australia	3			3	9
2	Germany	2	1	1	4	9
3	Switzerland	2			2	6
4	India	1		2	3	5
4	USA	1		2	3	5
6	Falkland Islands (Malvinas)	1			1	3
6	Finland	1			1	3
6	Namibia	1			1	3
6	Tunisia	1			1	3
6	Vietnam	1			1	3
11	China		2		2	4
12	Denmark		1	1	2	3
13	Argentina		1		1	2
13	Bangladesh		1		1	2
13	Fiji		1		1	2
13	Italy		1		1	2
13	Liechtenstein		1		1	2
13	Luxembourg		1		1	2
13	New Zealand		1		1	2
13	Portugal		1		1	2
13	Uganda		1		1	2
13	Zambia		1		1	2
23	France			2	2	2
24	Austria			1	1	1
24	Lithuania			1	1	1
24	Mexico			1	1	1
24	Myanmar			1	1	1
24	Nigeria			1	1	1
24	Uruguay			1	1	1
	TOTALS	14	14	14	42	84

With 42medals in contention in this Olympiad, there are 29 ‘winners’ with the majority of these (N=21)

scoring a single medal, and the remainder scoring two (N=5), three (N=1) or four medals (N=2) (Table 15). Countries ranging from big, such as Australia, China and USA, to small, such as Liechtenstein, Luxembourg, and the Falkland Islands (Malvinas), are represented. The countries identified in this Olympiad as organics leaders are broadly distributed across geo-regions: Europe (N=11; Africa (N=5); Asia (N=5); Oceania (N=3); South America (N=3, counting the Falklands/Malvinas); and North America (N=2).

4. Discussion and Conclusion

The Organics Olympiad 2016 bears witness that the current leadership of the organics movement is a world of great diversity - that is a cause for optimism and celebration. The 29 countries that score medals in the Organics Olympiad 2016 include countries large and small, developed and developing, rich and poor, geographically, ethnically and linguistically diverse, with countries from Oceania, Africa, Asia, Eastern and Western Europe, and North and South America. The 29 leaders identified in the Organics Olympiad 2016 are exemplars worthy of emulation as they each exhibit success in the uptake of organic practices. The statistics used, with the exception of the WWOOF and ICROFS statistics (Figs 13&14) are limited to certified organic. As such they are underestimates - there are numerous organic enterprises that are not certified (for example farms described in: Fawcett, 2016; Hudson, 2016; McLeod, 2016; & Odhong et al., 2015) and they are as a consequence, not recorded in certified organics statistics. So, while the achievements of the organic agriculture movement are somewhat modest, reported as 0.99% of world agricultural land, they are nevertheless not as modest as the statistics of the organics sector suggest.

The earliest pioneers of organic agriculture (e.g. Northbourne, 1940; Pfeiffer, 1938; Steiner, 1924) had visions unconstrained by the paradigm of certification, which came long after their advocacy. It may be that certified organics is the tip of an organics iceberg (in which naked organics, i.e. organics without certification), may exceed, and perhaps greatly exceed, certified organics). In any event, the world of certified organics is certainly the tip of the organics potential, which is the 99% of global agriculture which is not certified organic, and which is (probably) mostly chemical agriculture. The diversity of the leadership in the Organics Olympiad 2016 bodes well in the global march for the uptake of organic agriculture. The Indian state of Sikkim is reportedly now 100% organic (Oberst, 2016; Seetharaman, 2016). The Indian states of Kerala, Mizoram, and Arunachal Pradesh are aiming to achieve 100% organic status (Oberst, 2016; Vijayan, 2007). Bhutan has also set the bar high aiming to become 100% organic (Paull, 2013). France has set a goal to be 20% organic by 2020 (Lichfield, 2007). The Soil Association has proposed the goal for the UK of "Organic by 2050" (Soil Association, 2009). Russia has stated the intention of becoming a world leader in organic food (Case, 2015). The Atlas of Organics presents visual displays of the successful global diffusion of organics (Paull & Hennig, 2016). The path from goals to achievements may be facilitated by learning from the experiences of the organics leaders of this and previous Organics Olympiads.

Key implications of the Organics Olympiad 2016 are that:

- (a) the organics sector exhibits great diversity in leadership;
- (b) there are multiple exemplars of organics leadership for states aspiring to advance their organics sector;
- (c) since the previous Organics Olympiad published in the *Journal of Social and Development Sciences* (JSDS) (Paull, 2011c), some leaders have entrenched their leadership, for example, Australia (Table 1), has increased its organic agriculture hectares by 43% while in the same period the global organic agriculture hectares have increased by 17%;
- (d) some leaders have reasserted their leadership, for example, the Falkland Islands (Malvinas) retain their leadership for organic share of agricultural land (Table 7) - with a modest increase from 35.7% to 36.3% since the previous JSDS account;
- (e) some leaders have newly appeared since the previous JSDS account, for example, Zambia has surged to position two for organic wild culture (Table 2), while Tunisia has streaked ahead to position one for organic forestry (Table 4) - neither ranked in the previous JSDS Olympiad;
- (f) there is some volatility in the organics sector, for example, China was previously the leader in organic aquaculture, but has disappeared in the present Olympiad (Table 3);
- (g) as statistics become available, the non-certified organics sector (i.e. naked organics) can broaden out the view of organics leadership - in the present Olympiad, WWOOF statistics are included (at Table 13);
- (h) with organic agriculture accounting for just 0.99% of global agriculture, the Olympiad underscores the

- great opportunities that there are for the expansion of the organics sector;
- (i) stated goals may facilitate progress in the organics sector - with various publicly declared goals, India continues to exhibit leadership with the number of producers (Table 6), while , apparently without any publicly stated goals, Australia maintains its leadership (Table 1).

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